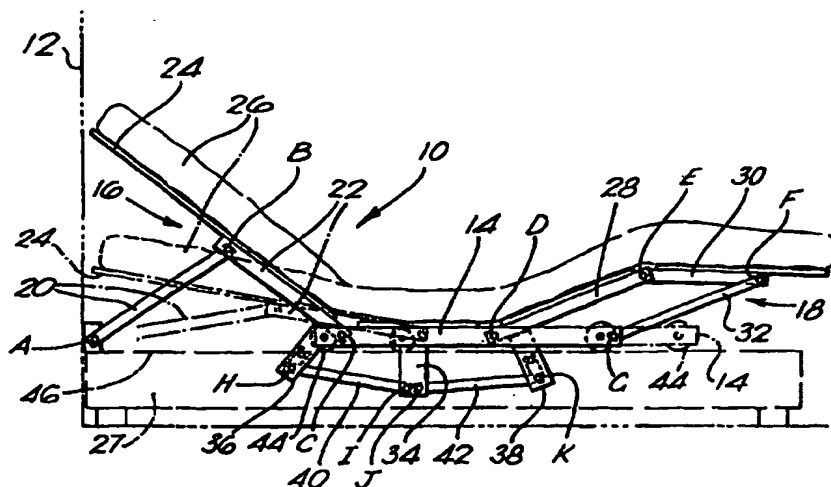




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(21) International Application Number: PCT/GB97/00477 (22) International Filing Date: 20 February 1997 (20.02.97) (30) Priority Data: 9603583.7 20 February 1996 (20.02.96) GB (71) Applicant (for all designated States except US): NIAGARA MANUFACTURING LTD. [GB/GB]; Colomendy Industrial Estate, Rhyll Road, Denbigh, Clwyd LL16 5TS (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): ALDERSON, Neville, Clifford [GB/GB]; Mullacott Cross Industrial Estate, Ilfracombe, Devon EX34 8PL (GB). (74) Agent: HOWICK, Nicholas, Keith; Carpmals & Ransford, 43 Bloomsbury Square, London WC1A 2RA (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: AN ADJUSTABLE BED



(57) Abstract

An adjustable bed (10) comprises a base portion (27), a main support portion (14) and a head support portion (16) pivotably connected to the main support portion (14) adjacent a first end of the main support portion (14). The main support portion (14) is slidable in a substantially horizontal direction relative to the base portion (16) of the bed (10). The bed (10) also comprises means (20, 22, 34, 36, 40) for effecting such movement of the main support portion (14) towards the head support portion (16) when the head support portion (16) is pivoted in an upward direction. The arrangement is such that a first end of the head support portion (16) remote from the main support portion (14) remains substantially in the same vertical plane irrespective of the angle between the head support portion (16) and the main support portion (14).

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AN ADJUSTABLE BED

The present invention relates to an adjustable bed, and in particular to a bed in which head and foot sections
5 of the bed can be independently raised or lowered to provide a plurality of resting positions.

Generally, such adjustable beds comprise a central support portion in connection with head and foot support
10 portions. The head and foot portions are independently pivotable about respective axes which extend in a transverse direction to a longitudinal dimension of the bed.

However, with such adjustable beds, when the head
15 support portion is pivoted upwardly of the central support portion, the head and shoulders of an occupant of the bed move both in a vertical direction and in a horizontal direction towards the foot end of the bed. As a result, the head and shoulders of the occupant move away from any
20 bedroom furniture or equipment which may be located adjacent the head end of the bed. This may be undesirable if, for example, a connection exists between a piece of equipment which is located adjacent the head end of the bed and the occupant's head.

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According to the present invention, there is provided an adjustable bed comprising a base portion, a main support portion, a head support portion pivotably connected to the main support portion adjacent a first end of the main
30 support portion, the main support portion being adapted to slide in a substantially horizontal direction relative to the base portion of the bed, and means for effecting said movement of the main support portion towards the head support portion in conjunction with the head support portion
35 being pivoted in an upward direction, the arrangement being such that a first end of the head support portion remote from the main support portion remains substantially in the same vertical plane irrespective of the angle between the

head support portion and the main support portion.

Preferably, the said means for effecting movement of the main support portion comprises a first link bar 5 pivotably connected adjacent one end thereof to the head support portion and pivotably connected adjacent the other end thereof to the base portion of the bed.

Preferably, the first link bar is connected to the 10 head support portion at a location intermediate the first end of the head support portion and a second end of the head support portion remote from the first end, and the first link bar is connected to the base portion at an end of the base portion adjacent the head support portion.

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Preferably, the angle between the head support portion and a horizontal line through the point of intersection of the head support portion and the first link bar is substantially the same as the angle between the first link 20 bar and the said horizontal line irrespective of the angle of elevation of the head support portion.

Preferably, the said means for effecting movement of the main support portion comprises at least one first 25 actuator adapted to effect pivotal movement of the head support portion.

Preferably, the main support portion is provided with a first projecting member and the head support portion is 30 provided with a second projecting member, the first actuator being pivotably connected to the first and second projecting members adjacent first and second opposite ends of the first actuator respectively, and the longitudinal length of the first actuator being extensible or retractible in response 35 to operation of the first actuator.

Preferably, the main support portion is provided with a plurality of guide wheels adapted to cooperate with a

guide track located on the base portion of the bed.

Preferably, the head support portion comprises a second link bar pivotably connected to the first link bar and pivotably connected to the main support portion, and a mattress support portion affixed to the second link bar so as to overlie the second link bar.

Preferably, the bed further includes a foot support portion pivotably connected to the main support portion adjacent a second end of the main support portion opposite to the first end thereof, and a second actuator adapted to effect pivotal movement of the foot support portion so as to thereby raise the foot support portion.

A specific embodiment of the present invention is now described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a diagrammatic representation of an adjustable bed in accordance with a first embodiment of the present invention; and

Figure 2 is a diagrammatic representation of an adjustable bed in accordance with a second embodiment of the present invention.

Referring to Figure 1, there is shown an adjustable bed 10 located adjacent a wall 12.

The bed 10 comprises a base portion 27, a main support portion 14, a head support portion 16, a foot support portion 18 and a first link bar 20. The figure shows the bed 10 with the first link bar 20 and features of the main support portion 14 and the head support portion 16 in two different locations.

The head support portion 16 comprises a second link

bar 22 and a mattress support member 24 for supporting a head portion of a mattress 26, the mattress support member 24 being affixed to the second link bar 22 so as to overlies the second link bar 22.

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The first link bar 20 is pivotably connected to the base portion 27 of the bed at pivot A and pivotably connected to the second link bar 22 at pivot B which is located between opposite ends of the head support portion 16. The second link bar 22 is pivotably connected to the main support portion 14 at pivot C.

The configuration of the head support portion 16 and the first link bar 20 is such that the first link bar 20 and the portion of the mattress support member 24 spaced from the second link bar 22 form an isosceles triangle.

The foot support portion 18 comprises third, fourth and fifth link bars 28, 30, 32 pivotably connected together and to the main support portion 14 at pivots D, E, F and G.

The main support portion 14 is provided with a first projection 34 extending substantially perpendicular to the plane of the main support portion 14. The second and third link bars 22, 28 are provided with second and third projections 36, 38 respectively located adjacent pivots C and D, the second and third projections 36, 38 extending substantially perpendicular to the axes of the second and third link bars 22, 28. Between the first and second projections 34, 36 there is provided a first actuator 40 pivotably connected at ends thereof to the first and second projections at pivots I and H respectively. Likewise, a second actuator 42 is provided between the first and third projections 34, 38, the second actuator 42 being connected to the first and third projections 34, 38 at pivots J and K respectively.

The bed 10 is also provided on the main support

portion 14 with guide wheels 44 adapted to cooperate with a guide track 46 located on the base portion 27 of the bed 10. The guide wheels 44 and guide track 46 facilitate movement of the main support portion 14 in a horizontal direction.

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When it is desired to raise the head support portion 16 of the bed, operation of the first actuator 40 is effected, and the length of the first actuator 40 increases. As a result, the second projection 36 and the second link 10 bar 22 rotate in a clockwise sense about pivot C, thereby raising the head portion of the mattress. This, in turn, causes the main support portion 14 to slide on the guide wheels 44 along the guide track 46 in a direction towards the wall 12, the second link bar 22 rotating about pivot B 15 in a clockwise sense. At the same time the first link bar 20 rotates about pivot A in an anticlockwise sense.

It is apparent therefore that extension of the first actuator 40 simultaneously effects raising of the head 20 portion of the mattress and movement of the main support portion 14 in a direction towards the wall 12.

It will be appreciated that, in this way, the edge of the head support portion remote from the main support 25 portion - which is adjacent the head of the occupant of the bed - remains substantially in the same vertical plane irrespective of the angle between the head support portion 16 and the main support portion 14.

30 It will also be appreciated that the angle between the head support portion 16 and the horizontal is substantially the same as the angle between the horizontal and the first link bar 20.

35 It will also be appreciated that the actuator 40 may be operated so as to reduce the length of the actuator. Such an operation serves to lower the head portion of the bed.

Operation of the second actuator 42 causes the length of the second actuator 42 to extend. As a result, the third link bar 28 rotates about pivot D in an anticlockwise sense and the foot support portion 18 is thereby raised.

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In the second embodiment shown in Figure 2, the first actuator is provided between the second projection 36 and a pivot connected to the base portion 27. Thus, in order to raise the head support portion 16 of the bed, the length of the actuator 40 decreases. As with the first embodiment, the second projection 36 and the second link bar 22 rotate in a clockwise sense about pivot C.

In all other respects, the second embodiment is identical to the first embodiment.

It will be appreciated that the first and second actuators 40, 42 can be operated either manually or by electronic means, such as by remote control.

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It will of course be understood that the present invention has been described above purely by way of example, and that modifications of detail can be made within the scope of the invention.

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CLAIMS:

1. An adjustable bed comprising a base portion, a main support portion, a head support portion pivotably connected to the main support portion adjacent a first end of the main support portion, the main support portion being adapted to slide in a substantially horizontal direction relative to the base portion of the bed, and means for effecting said movement of the main support portion towards the head support portion in conjunction with the head support portion being pivoted in an upward direction, the arrangement being such that a first end of the head support portion remote from the main support portion remains substantially in the same vertical plane irrespective of the angle between the head support portion and the main support portion.

2. An adjustable bed as claimed in claim 1, wherein the said means for effecting movement of the main support portion comprises a first link bar pivotably connected adjacent one end thereof to the head support portion and pivotably connected adjacent the other end thereof to the base portion of the bed.

3. An adjustable bed as claimed in claim 2, wherein the first link bar is connected to the head portion at a location intermediate the said first end of the head support portion and a second end of the head support portion remote from the said first end, and the first link bar is connected to the base portion at an end of the base portion adjacent the head support portion.

4. An adjustable bed as claimed in claim 2 or claim 3, wherein the angle between the head support portion and a horizontal line through the point of intersection of the head support portion and the first link bar is substantially the same as the angle between the first link bar and the said horizontal line irrespective of the angle of elevation of the head support portion.

5. An adjustable bed as claimed in any one of the preceding claims, wherein the said means for effecting movement of the main support portion comprises at least one first actuator adapted to effect said pivotal movement of the head support portion.

6. An adjustable bed as claimed in claim 5, wherein the main support portion is provided with a first projecting member and the head support portion is provided with a second projecting member, the first actuator being pivotably connected to the first and second projecting members adjacent first and second opposite ends of the first actuator respectively, and the longitudinal length of the first actuator being extensible or retractable in response to operation of the first actuator.

7. An adjustable bed as claimed in any one of the preceding claims, wherein the main support portion is provided with a plurality of guide wheels adapted to cooperate with a guide track located on the base portion of the bed.

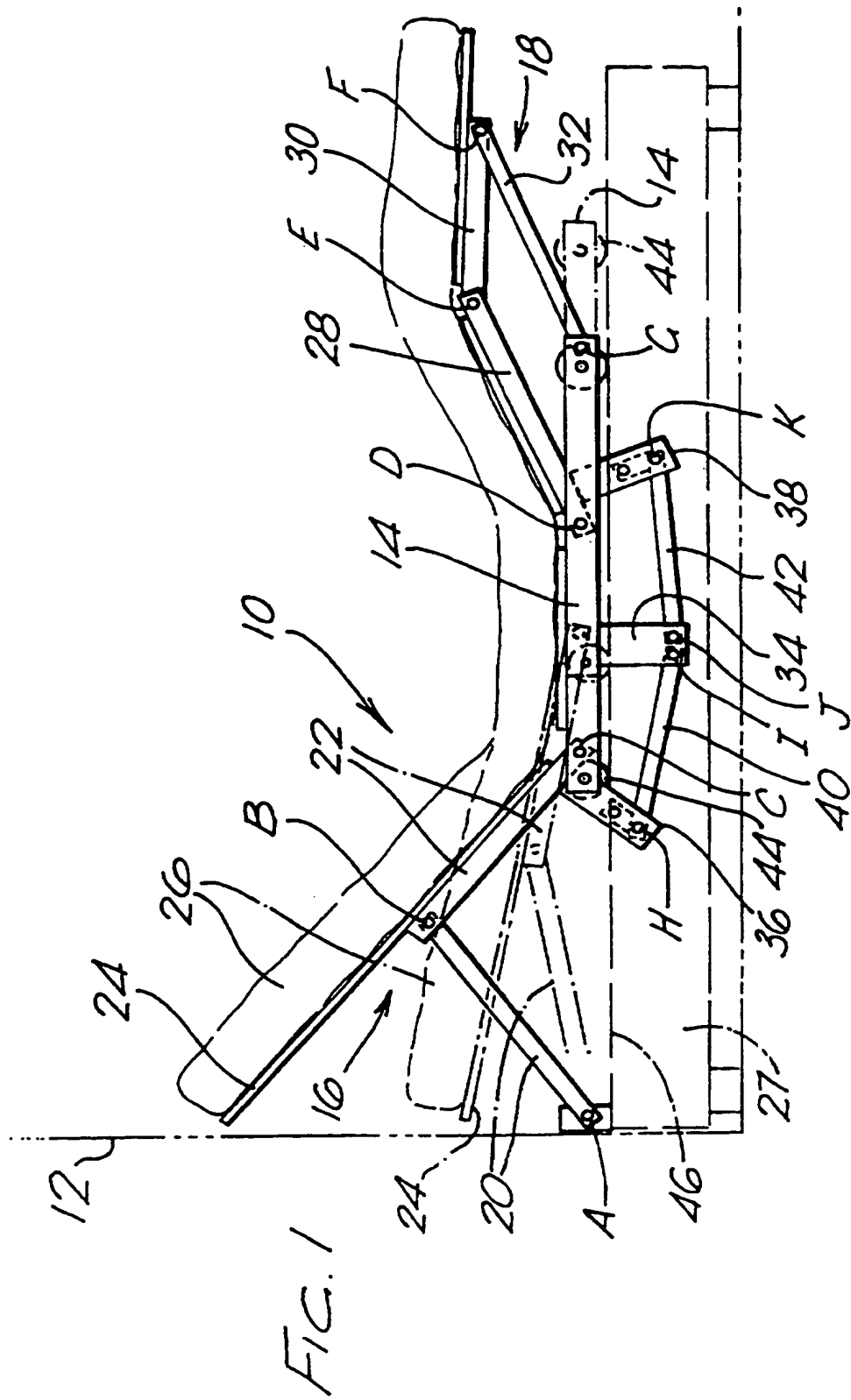
8. An adjustable bed as claimed in any one of the preceding claims, wherein the head support portion comprises a second link bar pivotably connected to the first link bar and pivotably connected to the main support portion, and a mattress support portion affixed to the second link bar so as to overlie the second link bar.

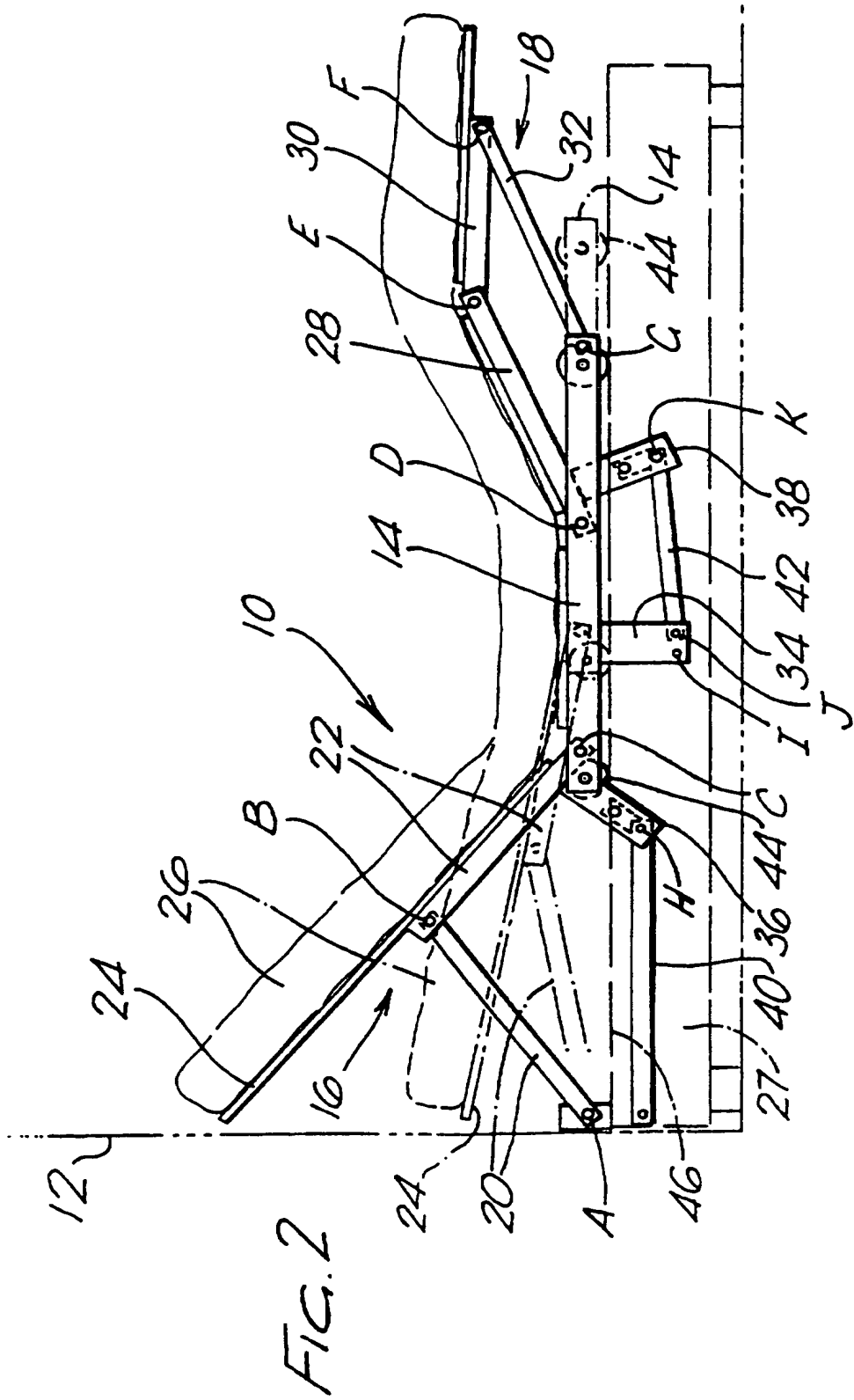
9. An adjustable bed as claimed in any one of the preceding claims, further comprising a foot support portion pivotably connected to the main support portion adjacent a second end of the main support portion opposite to the first end thereof, and a second actuator adapted to effect pivotal movement of the foot support portion so as to thereby raise the foot support portion.

10. An adjustable bed assembly comprising a base portion,

a head support portion and means permitting said head support portion to be pivoted in an upward direction, the arrangement being such that a first end of the head support portion remains substantially in the same vertical plane
5 irrespective of the angle between the head support portion and the base portion.

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INTERNATIONAL SEARCH REPORT

In' / onal Application No

PCT/GB 97/00477

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A47C20/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A47C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 678 261 A (ONIRIS) 25 October 1995	1-5,7,8,10
A	see the whole document	6
A	DE 93 08 246 U (VAUTH-SAGEL) 6 October 1994 see page 8, last paragraph; figures	9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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22 May 1997

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INTERNATIONAL SEARCH REPORT

information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 678261 A	25-10-95	FR 2718621 A	20-10-95
DE 9308246 U	06-10-94	NONE	